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Bibliography

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5H026 AA06 CC03 CX07 EE18

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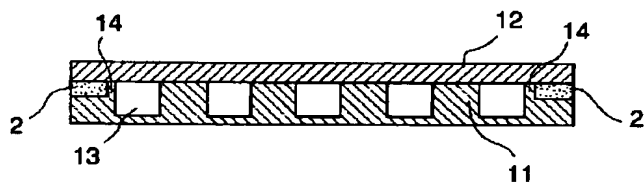
Epitome

(57) [Abstract]

[Technical problem] It is small, the miniaturization of the components which can be used as a fuel cell which is easy to deal with it is possible, and productivity offers a good polymer electrolyte fuel cell separator.

[Means for Solution] In the polymer electrolyte fuel cell separator which becomes central fuel gas passage (A) from the metallic thin plate which prepared an inflow and the gas-passageway section (1) for making it flow out about fuel gas, It consists of two or more slots (13) formed from the spacer (12) with which the gas-passageway section (1) covers the septum section (11) and the upper part of two or more trains. The polymer electrolyte fuel cell separator characterized by having prepared the weir section (14) for preventing that adhesives overflow in the top surface part by the side of the slot of the both-ends septum section, having applied adhesives (2) to the upper part of the above-mentioned both-ends septum section, and joining a spacer (12) to the septum section (11).

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## CLAIMS

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### [Claim(s)]

[Claim 1] In the polymer electrolyte fuel cell separator which becomes central fuel gas passage (A) from the body of a metallic thin plate which prepared an inflow and the gas-passageway section (1) for making it flow out about fuel gas It consists of two or more slots (13) formed from the spacer (12) with which the gas-passageway section (1) covers the septum section (11) and the upper part of two or more trains. The polymer electrolyte fuel cell separator characterized by having prepared the weir section (14) for preventing that adhesives overflow in the top surface part by the side of the slot of the both-ends septum section, having applied adhesives (2) to the upper part of the above-mentioned both-ends septum section, and joining a spacer (12) to the septum section (11).

[Claim 2] The polymer electrolyte fuel cell separator according to claim 1 characterized by adhesives consisting of silicone system adhesives.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] It is the polymer electrolyte fuel cell separator which can be used as a fuel cell which this invention is small and is easy to deal with it, and especially, the miniaturization of components is possible and productivity is related with a good separator.

[0002]

[Description of the Prior Art] Corresponding to the latest environmental problem and the latest resource problem, development of a fuel cell is performed actively. Especially, it is small, and a polymer electrolyte fuel cell is examined as a fuel cell

which is easy to deal with it, a miniaturization is required more as a separator further for cells, and since it is used piling up many separators, precision is excellent, and the separator with sufficient productivity is demanded.

[0003] With the above-mentioned polymer electrolyte fuel cell, the thing of a configuration (stack) of having used metallic thin plates, such as a stainless steel plate, as the body of a separator as a separator, having formed the packing material of corrosion resistance in the periphery section, having intervened the electrolyte membrane etc., and having carried out the polymerization of many separators was known, and an example of such a separator was shown in the top view of drawing 3. The fuel gas passage A is established in the center section of the separator, and the packing material 3 shown in the periphery section with the slash is covered. Fuel gas etc. leads the gas-passageway section 1, and flows and flows out of the exterior in the central fuel gas passage A.

[0004] In the above-mentioned separator, since a packing material 3 is covered, as the gas-passageway section 1 is shown in the outline perspective view of drawing 2, passage is formed by two or more slots 13 and spacers 12. Although junction of a spacer 12 was conventionally joined using the septum section 11 upper part and adhesives of the gas-passageway section 1, it was easy to protrude adhesives and there was a problem that the part entered a slot and checked a normal flow of fuel gas. Then, the activity which removes the adhesives overflowing into a slot by the help was needed, and there was a problem that the productivity fell remarkably.

[0005]

[Means for Solving the Problem] The place which this invention finds out the polymer electrolyte fuel cell separator which can cancel an above-mentioned trouble, and is made into the summary In the polymer electrolyte fuel cell separator which becomes the central fuel gas passage A from the metallic thin plate which formed an inflow and the gas-passageway section 1 for making it flow out about fuel gas It consists of two or more slots 13 formed from the spacer 12 with which the gas-passageway section 1 covers the septum section 11 and the upper part of two or more trains. The weir section 14 for preventing that adhesives overflow is formed in the top surface part by the side of the slot of the both-ends septum section, and it is in the polymer electrolyte fuel cell separator characterized by having applied adhesives 2 to the upper part of the above-mentioned both-ends septum section, and joining a spacer 12 to the septum section 11.

[0006]

[Embodiment of the Invention] Hereafter, this invention is explained in detail. Although the body of a separator in this invention is formed from a metallic thin plate and a steel plate, a stainless steel plate, a plating processing steel plate, an aluminum plate, a copper plate, a titanium plate, etc. are suitable as a metallic thin plate, it is not limited to these. Thickness is about 0.3mm and the fuel gas passage A is formed in a center section with a concave convex gas slot pattern (it is omitting in drawing 3). A reactant gas path hole and a cooling-medium path are punched at the periphery section, and the gas-passageway section 1 is open for free passage with the fuel gas passage A.

[0007] The gas-passageway section 1 has formed the weir section 14 for

preventing that consist of two or more slots 13 formed from the spacer 12 which covers the septum section 11 and the upper part of two or more trains as shown in drawing 1 and drawing 2, and adhesives overflow into the top surface part by the side of the slot of the both-ends septum section.

[0008] As for the depth of the weir section 14, it is desirable that it is in 10% - 50% of range of the depth of a slot 13, and at less than 10%, if there is little flash prevention effectiveness of adhesives and it exceeds 50%, the weir section will tend to become weak in reinforcement. Adhesives 2 are applied to the upper part of the both ends of the above-mentioned septum section 11, and a spacer 12 is joined to the septum section 11. Although the thing of various presentations can be used as adhesives to be used, use of fields, such as chemical resistance and bond strength, to silicone system adhesives is desirable. It is not necessary to apply adhesives other than the both ends of the septum section 11, and this part can be bound tight and stuck when forming a stack as a fuel cell. Even if it applies adhesives to an excess a little by forming above-mentioned \*\*\*\* 14, it can prevent overflowing into a slot 13.

[0009] A packing material 3 is covered in the periphery section of at least one side of a metallic thin plate which formed the gas-passageway section 1 of the above-mentioned contents. The silicone resin which silicone resin is desirable as a packing material, and is used is liquefied silicone resin, and can use a 2 liquid type thing with usual addition mold liquefied silicone resin, and viscosity is 103-104. The resin of a poise (25 degrees C) can use it suitably.

[0010] The thickness of a silicone resin layer has the desirable range of 0.05mm - 1.0mm, by less than 0.05mm, it is hard to come out of the elasticity effectiveness, and inferior to the availability as a packing material, and for the application as an object for the separators of a polymer electrolyte fuel cell, it miniaturizes and the problem of becoming \*\*\*\*\* and cost quantity has it at the thing exceeding 1.0mm.

[0011]

[Example] Hereafter, although an example is explained, this invention is not limited to this.

(Example 1) The gas-passageway section as shown in the body of a separator with a die-length [ of 195mm ] x width of face of 185mm drawing 1 and 2 was prepared. It is 1.8mm in width of face of a slot 13 (width of face of 3.7mm, a depth of 0.3mm, die length of 12mm), and the septum section 11, and a depth of 0.1mm (33% of an opposite channel depth) of the weir section 14 and thickness were set to 0.05mm.

[0012] Silicone system adhesives ( trade name by Shin-Etsu Chemical Co., Ltd.

"KE-45") were used as adhesives, and the spacer made from stainless steel

(0.3mm in thickness) was joined to the upper part of the both-ends septum

section. Then, the packing material which becomes a circumference edge of a separator body from SHIRIKO resin was covered, and the separator was obtained.

There was also no adhesion of the foreign matter which considered the flash of the adhesives to a slot and the adhesives to central fuel gas passage as the cause with the obtained separator, and efficient production was possible.

[0013]

[Effect of the Invention] As mentioned above, the availability as a fuel cell which

productivity becomes good with the polymer electrolyte fuel cell separator of this invention, and it is small, and is easy to deal with it is large.

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**DESCRIPTION OF DRAWINGS**

[Brief Description of the Drawings]

[Drawing 1] It is the cross-section schematic diagram of the gas-passageway section of this invention separator.

[Drawing 2] It is the outline perspective view of the gas-passageway section.

[Drawing 3] It is the outline top view of a polymer electrolyte fuel cell separator in which the gas-passageway section was prepared.

[Description of Notations]

11 — Septum Section

12 — Spacer

13 — Slot

14 — Weir Section

2 — Adhesives

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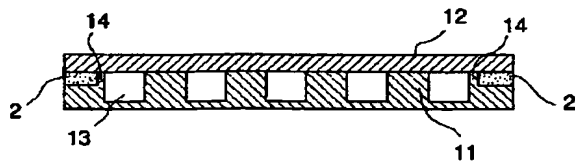
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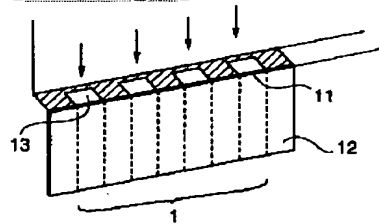
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**DRAWINGS**

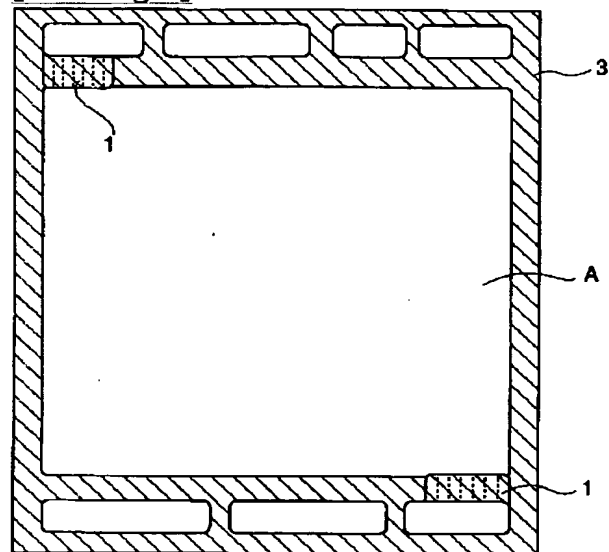
[Drawing 1]



[Drawing 2]



[Drawing 3]



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8/10		8/10	

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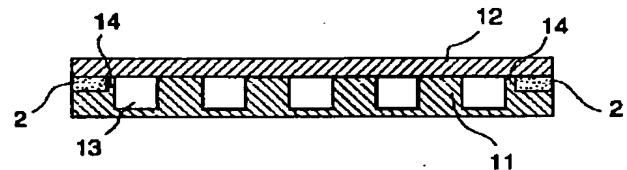
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(22) 出願日	平成10年7月29日 (1998.7.29)	(72) 発明者	宮川 倫成 神奈川県平塚市真土2480番地 三菱樹脂株式会社平塚工場内
		Fターム(参考)	5H026 AA06 CC03 CX07 EE18

(54) 【発明の名称】 固体高分子型燃料電池セパレータ

## (57) 【要約】

【課題】 小型で取り扱い易い燃料電池として使用できる部品の小型化が可能で生産性が良好な固体高分子型燃料電池セパレータを提供する。

【解決手段】 中央の燃料ガス流路 (A) に燃料ガスを流入・流出させるためのガス通路部 (1) を設けた金属薄板からなる固体高分子型燃料電池セパレータにおいて、ガス通路部 (1) が複数列の隔壁部 (11) とその上部を被覆するスペーサ (12) から形成される複数の溝部 (13) からなり、両端隔壁部の溝側の上側面部に接着剤がはみ出すことを防止するための堰部 (14) を設けて、上記両端隔壁部の上部に接着剤 (2) を塗布して隔壁部 (11) とスペーサ (12) を接合したことを特徴とする固体高分子型燃料電池セパレータ。





## 【特許請求の範囲】

【請求項1】 中央の燃料ガス流路(A)に燃料ガスを流入・流出させるためのガス通路部(1)を設けた金属薄板本体からなる固体高分子型燃料電池セパレータにおいて、ガス通路部(1)が複数列の隔壁部(11)とその上部を被覆するスペーサ(12)から形成される複数の溝部(13)からなり、両端隔壁部の溝側の上側面部に接着剤がはみ出すことを防止するための堰部(14)を設けて、上記両端隔壁部の上部に接着剤(2)を塗布して隔壁部(11)とスペーサ(12)を接合したことを特徴とする固体高分子型燃料電池セパレータ。

【請求項2】 接着剤がシリコン系接着剤からなることを特徴とする請求項1記載の固体高分子型燃料電池セパレータ。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】 本発明は、小型で取り扱い易い燃料電池として使用できる固体高分子型燃料電池セパレータであって、特に、部品の小型化が可能で生産性が良好なセパレータに関する。

## 【0002】

【従来の技術とその課題】 最近の環境問題や資源問題に対応して燃料電池の開発が活発に行われている。特に小型で取り扱い易い燃料電池としては固体高分子型燃料電池が検討され、さらに電池用のセパレータとして、より小型化が要求され、また多数のセパレータを重ね合わせて使用することから精度が優れ、生産性のよいセパレータが要求されている。

【0003】 上記固体高分子型燃料電池ではセパレータとしてステンレス鋼板等の金属薄板をセパレータ本体とし、周縁部に耐腐食性のパッキング材を設け、電解質膜等を介してセパレータを多数重合した(スタック)構成のものが知られ、このようなセパレータの一例を図3の平面図に示した。セパレータの中央部には燃料ガス流路Aが設けられ、周縁部に斜線で示したパッキング材3が被覆してある。燃料ガス等は外部からガス通路部1を通じて中央の燃料ガス流路Aに流入・流出される。

【0004】 上記セパレータにおいては、ガス通路部1はパッキング材3が被覆されるため、図2の概略斜視図に示すように複数の溝部13とスペーサ12により流路が形成されている。従来、スペーサ12の接合はガス通路部1の隔壁部11上部と接着剤を用いて接合していたが、接着剤がはみ出し易く、その一部が溝部に入り込み燃料ガスの正常な流動を阻害するという問題があった。そこで、溝部にはみ出した接着剤を人手により除去する作業が必要となり、その生産性が著しく低下するという問題があった。

## 【0005】

【課題を解決するための手段】 本発明は、上述の問題点を解消できる固体高分子型燃料電池セパレータを見出し

たものであり、その要旨とするところは、中央の燃料ガス流路Aに燃料ガスを流入・流出させるためのガス通路部1を設けた金属薄板からなる固体高分子型燃料電池セパレータにおいて、ガス通路部1が複数列の隔壁部11とその上部を被覆するスペーサ12から形成される複数の溝部13からなり、両端隔壁部の溝側の上側面部に接着剤がはみ出すことを防止するための堰部14を設けて、上記両端隔壁部の上部に接着剤2を塗布して隔壁部11とスペーサ12を接合したことを特徴とする固体高分子型燃料電池セパレータにある。

## 【0006】

【発明の実施の形態】 以下、本発明を詳しく説明する。本発明におけるセパレータ本体は金属薄板から形成され、金属薄板としては、鋼板、ステンレス鋼板、メッキ処理鋼板、アルミニウム板、銅板、チタン板等が好適であるが、これらには、限定されない。厚みは0.3mm程度であり、中央部に凹凸状のガス溝パターンにより、燃料ガス流路Aが形成される(図3では省略している)。周縁部には反応ガス通路孔や冷却媒体通路が穿孔され、燃料ガス流路Aとはガス通路部1により連通されている。

【0007】 ガス通路部1は図1、図2に示すように複数列の隔壁部11とその上部を被覆するスペーサ12から形成される複数の溝部13からなり両端隔壁部の溝側の上側面部に接着剤がはみ出すことを防止するための堰部14を設けてある。

【0008】 堰部14の深さは溝部13の深さの10%~50%の範囲にあることが好ましく、10%未満では接着剤のはみ出し防止効果が少なく、50%を越えると堰部が強度的に弱くなり易い。上記隔壁部11の両端部の上部には接着剤2を塗布して隔壁部11とスペーサ12を接合する。使用する接着剤としては各種組成のものが使用できるが耐薬品性や接着強度等の面からシリコン系接着剤の使用が好ましい。接着剤は隔壁部11の両端部以外に塗布する必要がなく、この部分は燃料電池としてスタックを形成するときに締め付けられ密着できる。上記堰部14を設けることにより若干過剰に接着剤を塗布しても溝部13にはみ出すことを防止できる。

【0009】 上記内容のガス通路部1を設けた金属薄板の少なくとも片面の周縁部には、パッキング材3を被覆する。パッキング材としてはシリコン樹脂が好ましく、使用するシリコン樹脂は液状のシリコン樹脂であって、通常の付加型液状シリコン樹脂で二液タイプのものが使用でき、粘度が10<sup>3</sup>~10<sup>4</sup>ポイズ(25℃)の樹脂が好適に使用できる。

【0010】 シリコン樹脂層の厚みは0.05mm~1.0mmの範囲が好ましく、0.05mm未満では、弾力効果が出にくく、パッキング材としての利用性に劣り、1.0mmを超えるものでは固体高分子型燃料電池のセパレータ用としての用途では小型化しずらく、また

コスト高になるという問題がある。

【0011】

【実施例】以下、実施例について説明するが、本発明はこれに限定されるものではない。

（実施例 1）長さ 195mm×幅 185mm のセパレータ本体に図 1、2 に示すような、ガス通路部を設けた。溝 13（幅 3.7mm、深さ 0.3mm、長さ 12mm）、隔壁部 11 の幅 1.8mm であって、堰部 14 の深さ 0.1mm（対溝深さの 33%）、厚みは 0.05mm とした。

【0012】接着剤としてシリコン系接着剤（信越化学工業（株）製 商品名「KE-45」）を使用して、ステンレス鋼製のスペーサ（厚さ 0.3mm）を両端隔壁部の上部に接合した。その後、セパレータ本体周辺縁部にシリコーン樹脂からなるパッキング材を被覆してセパレータを得た。得られたセパレータでは、溝部への接着剤のはみ出しや中央の燃料ガス流路への接着剤を原因と

した異物の付着もなく効率的な生産が可能であった。

【0013】

【発明の効果】上述したように、本発明の固体高分子型燃料電池セパレータでは生産性が良好となり、小型で取り扱い易い燃料電池としての利用性が大きい。

【図面の簡単な説明】

【図 1】本発明セパレータのガス通路部の断面概略図である。

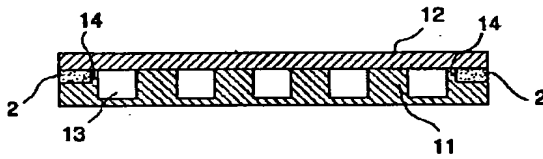
【図 2】ガス通路部の概略斜視図である。

10 【図 3】ガス通路部を設けた固体高分子型燃料電池セパレータの概略平面図である。

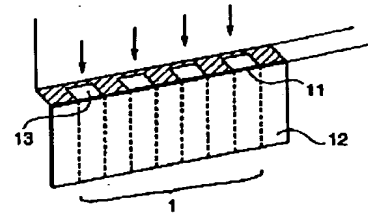
【符号の説明】

- 11 … 隔壁部
- 12 … スペーサ
- 13 … 溝部
- 14 … 堰部
- 2 … 接着剤

【図 1】



【図 2】



【図 3】

